I have a specimen in perfect health, which was captured at North Harbour three weeks ago. They eat small worms and crumbs of bread greedily when in confinement.

"I have sent a small specimen in spirits to accompany the drawing.

"George French Angas."

5. Notes on Sharks, more particularly on two enormous Specimens of Carcharias leucas, captured in Port Jackson, Sydney, New South Wales. By Dr. George Bennett, F.Z.S.

Sharks are formidable for their strength and the numerous rows of teeth with which their powerful jaws are armed; these teeth, inclining backwards, prevent the prey, once swallowed, from readily escaping without severe laceration, even if at all; the teeth are slightly moveable, which mobility, being merely to an erect position, renders the escape of prey still more difficult. The stomachs of these fish are found to contain a very mixed diet, some holding small fishes, or flying squids; others, paper, canvas, even tin pots, and offal of every description cast overboard from ships,—the stomachs being of enormous capacity, and, to judge from the contents and quantity found in them, these fishes having enormous powers of digestion.

As an article of food, a Shark is not considered good eating; but the flesh of a young one is preferable to that of many of the deep-water fishes, and by some considered superior to that of Bonitos or Albicores. The large Sharks are very coarse food: the liver in every species yields a large quantity of oil.

I have observed that if several Sharks are together, it is very seldom that a Pilot-fish (*Naucrates*) is seen to accompany them; but a solitary Shark is rarely or never seen without being accompanied by one or more of the latter. On capturing a Shark which was accompanied by Pilot-fish, by keeping the Shark in the water until it was exhausted, or, as the sailors termed it, "drowned," the Pilot-fish kept constantly about it; and, by aid of the towing net at the end of a long stick, I succeeded in capturing it as it swam on the surface of the water.

We find, as well in the Sharks as in all those kinds of fish which have a prolonged snout, the mouth situated far underneath, and the upper portion of the tail considerably lengthened, so that it may aid them in turning readily round; for this purpose also the eye-ball revolves on a cartilaginous pedicle with a ball and socket joint, so that they are capable of turning that organ in every direction to capture their prey.

An enormous Shark (*Carcharias leucas*, Valenciennes) was lately captured in Port Jackson by two boatmen, T. Mulhall and J. Rica, who finding him ranging about the harbour, procured a harpoon and went in chase of him. They succeeded in harpooning the monster, who when struck ran away with a great length of line. Being tired,

and finding himself fast, he rushed back again and attacked the boat, leaving five teeth broken in the wood. The boat fortunately was strong enough to bear the shock. He then ran off again to some distance, and, finding escape hopeless, rushed a second time at the boat. On this the men attacked and finally succeeded in disabling him by violent and repeated blows upon the head with a large piece of wood; they then towed him the whole length of the line, so as "to drown him," as it is termed, and brought him to Sydney alive, but helpless. He died some hours after being landed on the wharf, being very tenacious of life. The huge monster was soon a great object of curiosity, and, being enclosed, was duly advertised for exhibition to the public; whereby the capturers realized the very handsome sum of about £80. The animal was afterwards presented to the Museum, in which institution it remains in an excellent state of preservation. Its size, by actual measurement, is as follows:—

	feet.	inches.
The circumference of the body, about the centre	6	7
Height from the abdomen to the base of the dorsal fin	2	10
Height from the base of the pectoral fin	2	0
Length from the end of the tail to the point of the nose	12	4
Length of dorsal fin	1	1
Breadth of ditto at base	1	4
Length of pectoral fin	2	3
Length of second pectoral fin	0	8
Caudal fin, upper part	2	4
Caudal fin, lower part	1	9
Anal fin	0	$3\frac{1}{2}$
Second dorsal fin	0	4
Expansion of jaw, breadth	0	10
Perpendicular length of jaw	1	0

This is the expansion of the jaw in the dried state; when alive no doubt it could have been expanded to a greater extent. The head appears to be small in comparison to the enormous bulk and length of the body. There is a singular pectinated line running down on each side near the back from the base of the head to the commencement of the tail, as if situated just beneath the cuticle. The fish in its recent state was of a uniform bluish-grey colour, excepting the dorsal, caudal, and other fins, which were of a darker tint. Branchiæ 5. No spiracles. I would not venture to send one alive to the Zoological Gardens, as its keep would be ruinous; for the contents of the stomach were as follows:—

Eight legs of mutton, half a ham, hind quarters of a pig, head and fore legs of a bull dog with a rope round the neck, about 300 lbs. of horse-flesh, a ship's scraper, and a piece of bagging.

From the liver of the fish 12 gallons of oil were obtained.

On the 29th of September, 1858, I examined a Shark harpooned in the harbour of Port Jackson. It was similar in character to the

species of *Carcharias* previously described, and preserved in the Australian Museum. It measured as follows:—

	feet.	inches.
Length from the extremity of the nose to the tail	13	0
Circumference round the neck	5	6
Length from one end of the pectoral fin to that of the other	6	2
Length of pectoral fins	2	4
Circumference of the body below the pectoral fins	7	0
Length of dorsal fin	1	10
——— of tail	2	10
——— of ventral fins	1	1
——— of anal fins	0	5
——— of second dorsal fin	0	5

The contents of the stomach were large quantities of horse-flesh, as it was feeding upon a dead horse when captured. In the upper jaw there was apparently one row of large teeth, and at the angle there were two teeth of a second row, the largest tooth measuring $1\frac{1}{4}$ inch in length. In the lower jaw there were two rows of teeth. The teeth were inclined backwards and moveable. On a further and more minute examination it was discovered that five rows or more of teeth, fully formed, and well-serrated at their edges, were lying down under the loose thick skin or gum, inside the mouth, either to be elevated if required, or to supply the place of the front rows, when damaged or broken by accident.

I have observed the teeth in many Sharks disposed in five or more rows, the first and second rows erect, the others recumbent and concealed by a kind of gum.

In the early days of the settlement of New South Wales the oil of the Shark was found to be of great use. Collins states that "nothing was lost;" even the Shark was found to contain a certain supply; the oil which was procured from its liver was sold at 1*s*. a quart; and but very few houses in the colony were fortunate enough to enjoy the pleasant light of a candle. Even now at the Custom House station at Botany Bay Heads, Mr. Brett told me he captured the Spotted Tiger Shark, which species is very numerous about that locality, Watt's Shark, and other kinds, for the sake only of the oil to be produced from the livers, which he found very serviceable for lamps.

In the stomach of a Shark, near the pyloric orifice, I found a large quantity of Entozoa, varying in length, of a white colour and flattened form. These, being placed with a portion of the stomach in sea-water, displayed great vitality, rapidly elongating and contracting themselves; but they soon died on being immersed in fresh water, which was done previous to placing them in spirits.

A question may arise if any annoyance is produced to the Shark by the multitudes of these parasites; they could hardly have sufficient power to irritate the stomach of a fish that swallows, and, as it

is asserted, digests, tin pots, cloth, canvas, &c. I remarked that the inner surface of the stomach to which these parasites were attached appeared inflamed.

On the afternoon of the same day, three small Sharks were taken, the whole of which were also infested by similar parasites about the pyloric orifice of the stomach.

It is not a little singular that four Sharks caught about the same locality should have parasites. In one of the Sharks the worms were not only about the pyloric orifice of the stomach, but extended through the whole extent of the intestines, even penetrating the coats of the intestines themselves; and on examination, irritation of the coats of the bowels, and in some parts inflammation and ulcerated portions, were observed in several situations.

Preparations of these structures are deposited in the Museum of the College of Surgeons of England.

6. Notes on the Range of some Species of Nautilus, on the mode of Capture, and on the use made of them as an article of Food. By Dr. George Bennett, F.Z.S.

The three best known species of the genus *Nautilus* are *N. pompilius*, *N. macromphalus*, and *N. umbilicatus*. The first species is the most common and has the widest range; the second species is more limited in its range, and rarer; the third, although found in collections, is scarcer than the two preceding, and has a range peculiar to itself. The range of *N. pompilius* embraces the islands of the Eastern Archipelago, Erromanga, Aneitum, and other islands of the New Hebrides, and also the Feegee group. *N. macromphalus* is found about the Isle of Pines and New Caledonia; and the rare *N. umbilicatus* in the Solomon Archipelago, New Georgia, New Britain, New Ireland, and probably to the eastward of these groups of islands. Two very fine and perfect shells of *N. umbilicatus* were given to me in Sydney, which had been procured from the natives of Denys Island, New Ireland, eastward of New Guinea. Dr. Macdonald, of H. M. S. "Herald," informs me that on examination and comparison, there is a marked difference between the *tentacula* or feelers, in the first two species. The sculpturing on *N. umbilicatus* is very distinctly marked on the external surface of the shell, differently from what is observed either in *N. pompilius* or *N. macromphalus*, and forming one of its very distinctive characters. The outer edge of the lip of the perfect shell in *N. umbilicatus* has a narrow, black rim, continuous from the anterior portion of the whorl; this obtains in perfect shells. I remark that in *N. pompilius* and *N. macromphalus* the black rim is on the inner side of the edge of the lip. The colour of the shells in the different species varies from brick-red and orange (of brighter or paler tints) to nearly a dark crimson colour, being as various as the colour observed among the common Cowrie shells.